REMARKS

Claims 1-9 and 12-32, 34-38 and 42 are currently pending in this application. Claims 10, 11, 33 and 39-41 have been cancelled, without prejudice to filing one or more divisional or continuation applications directed to the cancelled subject matter.

Claim 23 has been amended, without prejudice, to clarify that, in some embodiments, outlet of the moving bed unit is provided with control means for controlling the outflow rate of particles from the moving bed unit such that settled polymeric particles move downwardly in a more or less plug stream in the moving bed unit. These amendments are supported at least at page 14, lines 4-15 of the specification. No new matter has been added to the application by the foregoing amendments.

The rejection of claims 23-28 under 35 U.S.C. §112, second paragraph, for indefiniteness was addressed in the prior Amendment After Final Rejection filed on March 26, 2010. Accordingly, Applicants respectfully request that the §112, second paragraph, rejection for indefiniteness be reconsidered and withdrawn.

Applicants provide further explanation regarding the differences between claims 1-9, 12-32, 34-38 and the disclosures of Harlin et al. and Mutsers et al. below.

§103(a) rejection of claims 1-9, 12-32, 34-38 over Harlin et al. in view of Mutsers et al.

Claims 1-9, 12-32, 34-38 have been rejected under 35 U.S.C. §103(a) as being obvious over Harlin et al. (U.S. Patent No. 6,469,110) in view of Mutsers et al. (WO 02/41 986 Al). The Office Action contends that Harlin et al. (Figure 1) discloses a polymerization process for preparing polypropylene in a reactor system comprising pluralities of reactors. Harlin et al. (column 11, lines 17-48) allegedly indicates that their polymerization process comprises a pre-polymerization reactor (1), a first loop reactor (40), and a second gas phase (fluidized bed) reactor (60). According to the Office Action, Harlin et al. (column 16, claim 24) teaches that a third gas phase reactor can be installed. Regarding the polymerization temperature and pressure requirements of claims 4, 7, Harlin et al. (column, 8 lines 48-65) allegedly teach the polymerization temperature of from 40 to 110°C and the pressure of 30 to 100 bar, which allegedly meet the requirements as claimed. Regarding the claimed "liquid phase" of claim 3

and the "propane" of claim 6, the Office Action contends that Harlin et al. (column 5, lines 62-64) clearly teach the use of propane as a medium. Regarding claims 8 and 9, the Office Action contends that Harlin et al. (column 11, line 33, item 50) clearly disclose the presence of a flash separator for removing hydrocarbons and/or hydrogen, which are present in the reactor (column 8, lines 35-40).

The Office Action argues that in view of the allegedly substantially identical processing condition, reactants, and apparatus disclosed in Harlin et al., the Office Action has a reasonable basis to believe that the claimed "the loop reactor is adapted to work under supercritical conditions" is inherently possessed in Harlin et al. The Office Action contends that the rationale set forth for the instant rejection is adequate since claim 25 fails to set forth any conditions or features that are required for running the polymerization process under supercritical conditions.

Regarding the claimed feature "the residence time in the moving bed is controlled by controlling the outflow rate of particles from the moving bed", the Office Action argues that in view of the substantially identical reactors disclosed in Harlin et al., he has a reasonable basis to conclude that the apparatus disclosed by Harlin et al. inherently possesses the claimed feature. The Office Action contends that Applicants must recognize that the apparatus comprises conduits that transfer from one reactor to the next reactor, therefore it would not be difficult for one of ordinary skill in art to conclude that transferring of mass from one reactor to the next would associate a change or a control on residence time. The Office Action notes that since the PTO does not have proper means to conduct experiments, the burden of proof is now shifted to applicants to show otherwise.

The Office Action acknowledges that the difference between the claimed invention and the process of Harlin et al. is that Harlin et al. does not teach a process involving a second reactor comprising a moving bed under such conditions that the residence time in the fluidized bed and the residence time in the moving bed are independently controlled.

The Office Action refers to Mutsers et al. (abstract) as disclosing a polymerization process wherein a fluidized bed reactor comprises a reaction chamber 4, and a reactor 2 which comprises one or more connecting pipes (10) running outside the reactor chamber 4. Regarding

the claimed "independently control" feature, the Office Action contends that Mutsers et al. (page 10, claims 1, 2, 4) discloses one or more connecting pipes running outside, where the cross-section ratio of the pipes to the reactor's cross-section can vary from 0.1 to 1.0, the angle can vary between 0 to 60 degree. Allegedly motivated by the expectation of success of introducing fresh monomer at the connection of the connecting pipes to the wall of the top part of the reactor chamber or to the wall of the outlet section (page 4, line 1.5), the Office Action argues that it would have been obvious to one of ordinary skill in art to replace the fluidized bed reactor of Harlin et al. with the fluidized bed reactor of Mutsers et al. to obtain a fluidized bed reactor having a "moving bed" as claimed. In view of Applicants' specification (page 9, lines 15-24) which states the requirement on how "independent control" can be achieved, the Office Action alleges that he has a reasonable basis to conclude that the teachings of Mutsers et al. have adequately taught the means for the claimed "independent control" feature. Although Applicants' specification (figures 2 and 3) indicates some specific features, such as inlet and nozzles installed in the moving bed for the purpose of "independent control", the Office Action notes that features described in the specification can not be read into the claims.

The Office Action further asserts, with regard to claims 12-18, 21 which contain process related features, such as "condensed mode", "a separation fluidum", "the residence time in the moving bed is independently controlled", and "the residence time in the moving bed is controlling by controlling the outflow rate of particles from the moving bed", that Harlin et al. clearly teach a process and apparatus that are substantially identical to the one as claimed, therefore the Examiner allegedly has a reasonable basis to assert that any minor variation of such teachings is considered obvious because motivated by the expectation of success of obtaining the polymerization process of Harlin et al., it would have been obvious to one of ordinary skill in art to vary the process of Harlin et al. to obtain the features of claims 10-18, and 21.

Applicants respectfully traverse this rejection and request that the rejection be reconsidered and withdrawn.

As reiterated by the Supreme Court in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, 82 U.S.P.Q.2d 1385 (2007), the framework for the objective analysis for determining obviousness under 35 U.S.C. §103 is stated in *Graham v. John Deere*. Examination Guidelines

for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg., No. 195 (October 10, 2007) at page 57527 (hereinafter "Examination Guidelines"). The factual inquiries enunciated by the Court are as follows:

(1) Determining the scope and content of the prior art;

(2) Ascertaining the differences between the claimed invention and the prior art; and

(3) Resolving the level of ordinary skill in the pertinent art.

Examination Guidelines at page 57527.

Present claim 1 relates to a process for the catalytic polymerization of olefins comprising the steps of: i) a first polymerization in a first reactor, wherein olefins are polymerized with a particulate catalyst, hydrogen and optional a comonomer in a fluidum of an inert low boiling hydrocarbon medium into an reaction mixture comprising polymerized olefins; and ii) a second polymerization in a second reactor, wherein the polymerized olefins are further polymerized in a fluidized bed and in a moving bed by settled polymeric particles moving downwardly in a more or less plug stream under such conditions that the residence time in the fluidized bed and the residence time in the moving bed are independently controlled, wherein the residence time in the moving bed is controlled by controlling the outflow rate of particles from the moving bed.

Present claim 23 relates to a reactor system for the catalytical polymerization of olefins comprising a first polymerization reactor for carrying out the first polymerization, which first reactor comprises inlets for olefins, catalyst, hydrogen, optional comonomer, and inert low boiling hydrocarbon medium, the first reactor further comprises a product outlet for a reaction mixture comprising polymerized olefins; and wherein the product outlet of the first reactor is connected to an inlet of a second reactor for carrying out the second polymerization, which second reactor comprises a reactant inlet, a fluidized bed unit, a moving bed unit and a product outlet, wherein the fluidized bed unit comprises means for maintaining a fluidized bed in the fluidized bed unit, the moving bed unit is provided with an inlet directly connected to the fluidized bed unit such that the residence time in the fluidized bed unit and the residence time in the moving bed unit are independently controlled, and the outlet of the moving bed unit is

provided with control means for controlling the outflow rate of particles from the moving bed unit such that settled polymeric particles move downwardly in a more or less plug stream in the moving bed unit.

Harlin et al. discloses a reactor system based on a first slurry reactor and a second gas reactor of the fluidized bed type for use in a polymerization of the type as that of the invention. *The Office Action acknowledges that Harlin et al. does not disclose a process involving a second reactor comprising a moving bed under such conditions that the residence time in the fluidized bed and the residence time in the moving bed are independently controlled.*

Mutsers discloses a fluidized bed reactor with a connecting pipe between bottom part and top part and an inflow of fresh monomer at the top side of the connecting pipe.

<u>Item 1: Control of residence time and outflow rate of particles</u>

A fluidized bed reactor is operated so that solid particles in an upward-flowing stream of fluid are suspended. The flow is upward due to the pressure difference with the highest pressure at the bottom. The fluid velocity is sufficient to suspend the particles, but not large enough to carry them out of the vessel. The operation is following, as shown in Mutsers:

- fluid enters the fluidized bed reactor at the bottom side (supply line 28); and

- a gas mixture leaves the fluidized bed reactor at the top side (rising gas stream 20). This gas stream is recirculated to the supply line. It preferably contains little polymer particles.

The Office Action's statement that Harlin et al. will have the residence time control feature based on controlling the outflow rate of the particles does not appear justified:

1. In the fluidized bed reactor, a mixture of gas and polymer will be withdrawn from the reactor. It therefore does not make sense to refer to the 'outflow rate of particles'; and

2. The most important control parameter in the fluidized bed is not the outflow rate of a gas stream. As specified by Mutsers (page 7, line 27), 'the desired gas composition and gas flow rate are restored by supplying reacting components'. Hence, the supply of reacting components is a key control parameter rather than the outflow rate of the gas stream

Item 2: The alleged disclosure of a moving bed by Mutsers

As explained above, a fluidized bed reactor has a pressure difference with the highest pressure at the bottom part and a lower pressure at the top part. Mutsers discloses a connecting pipe extending from the bottom part to the top part. Mutsers further discloses that the gas supply will flow into the connecting pipes from the bottom part to the top part, in line with the pressure difference (page 6, lines 4-8).

Mutsers' connecting pipes serve to allow that more liquid, relative to the amount of gas, can be supplied to the reactor (see page 3, line 23-25), while a stable fluidized bed may be maintained.

The function of stabilizing the fluidized bed supports Applicants' reading – contrary to the Examiner's understanding – that Mutsers does not disclose a moving bed at all, and that it would not be an obvious thought to arrive at a moving bed.

An unstable fluidized bed is one with a too large gas velocity (related to a too large pressure difference). Herein, the amount of bubbles increases, leading to expansion of the bed, and instabilities: some of the gas starts bypassing the rest of the bed in the form of bubbles. These bubbles grow in size as they rise up to the column and pressure drops. Additionally, the particles are moving in a highly agitated fashion. This is not desired.

When more liquid is put into the reactor at the bottom side, and the temperature of the liquid increases due to the generated heat in the polymerization, liquid will expand and eventually evaporate. This leads to a major volume increase, and hence pressure increase at the bottom part.

When now Mutsers claims to have less instability with higher liquid rate due to the connecting pipes, it implies that these connecting pipes can be used to transport gas flow when a high pressure difference arises, e.g., outside the main portion of the fluidized bed and thus with less resistance. A critical feature of the connecting pipes is thus that they are open at the bottom side. Not surprisingly, the upper portion of the connecting pipe may have smaller diameter than the lower portion (page 5, lines 25-26).

Now, in a moving bed, the flow of particles has a direction which is reverse to that of the fluid flow. In order to generate this, and to make sure that the moving bed is not

flown away through fluidization, it is necessary to regulate the outflow rate of the particles in the moving bed (i.e., in the downward direction). Such regulation of the outflow rate will however be a barrier in case that a high pressure difference needs to be compensated. That is contrary to the needs for establishing a good connecting pipe for increasing stability.

Therefore, Mutsers does not disclose a moving bed. Moreover, it is not obvious to modify Mutsers to arrive at a moving bed; the underlying operating principle is completely different.

Item 3: The combination of Harlin et al. and Mutsers

It will now be clear that the combination of Harlin et al. and Mutsers does not lead to a reactor system with a first slurry reactor and a second gas phase reactor including both a fluidized bed and a moving bed. The combination would lead to a stabilized fluidized bed reactor with a larger liquid/gas inflow ratio. Accordingly, there is no motivation to combine Harlin et al. with Mutsers.

Summary

Thus, in short, the key element of a moving bed is not disclosed in Mutsers. On the contrary, Mutsers teaches away from a moving bed. Furthermore, the Examiner's suggestions that the control of residence time by controlling the outflow rate of particles would be inherent in the fluidized bed reactor of Harlin et al. cannot be understood, as, in a fluidized bed reactor, there is no separate outflow of particles. Therefore, present claims are not obvious over the recited combination of Harlin et al. and Mutsers.

Therefore, even if the disclosure of Harlin et al. was combined with the disclosure of Musters as set forth in the Office Action, the combination does not suggest or disclose a moving bed, that the residence time of the polymer in the fluidized bed would be independently controlled from that of the polymer within the moving bed, controlling the outflow rate of particles from the moving bed, or settled polymeric particles moving downwardly in a more or less plug stream, as specified in independent claims 1 and 23.

Accordingly, since Harlin et al., further in view of Mutsers, combined as set forth in the Office Action, fails to suggest or disclose at least one element of independent claims 1 and

23, the cited combination of Harlin et al., further in view of Mutsers, does not obviate these claims. Applicants respectfully request reconsideration and withdrawal of the §103 rejection of claims 1-9, 12-32, 34-38 over the disclosures of Harlin et al., further in view of Mutsers, combined as set forth in the Office Action.

Conclusion

It is believed that any pending objections and rejections have been addressed. However, the absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Applicants submit that the pending claims are in condition for allowance, which action is requested. The Examiner is invited to contact the undersigned directly at 412-227-3061 with any questions.

Respectfully submitted,

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